The Relationship Between Nursing and Medical Cultures: Implications for the Design and Implementation of a Clinicians' Workstation

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ABSTRACT

The culture of different professions is manifest in how members relate to each other and in how they organize and store data and information. For developers of clinical workstations intended to support not only the independent tasks but also the interdependent tasks of multiple health professionals, recognition of cultural differences among groups of health care professionals may be of great importance. Allowance for and adaptation to these differences are likely to be important for both acceptance and effective use of clinical workstations. Examples are drawn from Nursing and Medicine based on a clinicians' workstation currently in use and undergoing continuous development.

INTRODUCTION

The implementation of workstations in the health care arena has tended to follow along functional, departmental, or professional lines. Early systems were focused on information necessary for the billing and accounting in the hospital, and tended to be functional. Patient data, bed utilization, and in some cases charges for laboratory tests, medications and consumables were gathered. The early HIS was not tied to clinical information or decision making. The Ward Clerk or Unit Clerk used the system to collect data about patient charges and utilization and assembled the data for billing insurers.

Computing began emerging in other hospital departments. This was seen most significantly in the laboratory where many of the analyzers were already automated. The logical extension was then to coordinate the individual computer based applications and to tie them together. This made processes within the laboratory more efficient and automatically provided paper reports which could then be returned to patient care units for use by the clinical practitioners.

Pharmacies were among the next to address the need for computer technology. As pharmacology became more complex, computers were developed to assist in managing the growing number of drugs which were being prescribed. This grew to include examination for complex interactions among the drugs themselves. Computer systems took on a critical role in protecting the safety of patients in a complex work environment.

This move toward patient focused computing has continued in the development of the Physician Work Station. Connelly et al. [6], Tang et al. [15], and others have addressed the need for the development of the Physician Workstation. The workstation concept allows for the integration of clinical data from numerous sources, the display of that data in ways which facilitate clinical decision making and, in some cases, allow for the application of rules which will assist or enhance the clinical decision making process.

What is common to all of these views of computing in the clinical environment is that all of the systems were targeted for a single class of user: Unit Clerks, Pharmacists, Physicians etc. The development of a Clinicians' Workstation (CWS) changes that assumption. These clinical systems require integration of the data and meet the discipline specific needs of different clinicians. They must also support the coordination and completion of interdependent tasks performed by multiple clinician groups. Here we are primarily concerned with the needs of nurses and physicians.

Because of the increasingly close tie between clinicians and information technology, workstation developers may need more sensitivity to issues of professional culture. Clancey [5] has suggested that medical culture may have been one of the reasons why MYCIN and early expert systems may have failed to have clinical impact. We will review elements of the culture of each of these health disciplines, and discuss the implications for the design and development of a CWS.

CULTURE

Schein [13, p. 13] has defined culture as "a pattern of shared basic assumptions that the group has learned as it solved problems of external adaptation

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and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems." Some important components of culture include shared values, heroes, rituals, and communication patterns [3]. The background of culture gives a frame of reference to understand that there are discipline specific needs and that they have a long historical basis. If a CWS is going to meet the multiple needs of the various clinical disciplines which will use the workstation, it must include not only the discipline specific data and information, but it must also have the ability to communicate, at proper levels of specificity, information among the various disciplines. This communication of information must be able to assist and enhance the current information flow among the disciplines.

NURSING CULTURE

Nurses historically functioned as the 'hands' of the physician. The direct care of the patient with the 'hands on' approach has been and continues to be valued by nurses. In her historical analysis of American Nursing, Melosh [12] discusses a number of the changes that have occurred as nursing has evolved from the 'physician hand' to a separate professional practice. In her analysis, she notes that nursing originally received its power and prestige as a secondary benefit of the power of physicians. In addition, nursing had control of a number of technical practitioners such as aides and orderlies. This direct control of other groups also gave the appearance of power and status.

Common in the review by Melosh ,as well as in work cited by Mauksch [11], Burman [1], and Byers [2], is that nursing is undergoing a period of rapid change. One of the critical elements of that change is the way in which multiple providers and technology are impacting the traditional role of nursing. The nurses' role continues to be invaded by technology. That technology often demands considerable attention in its own right. The maintenance of respirators, IV pumps, cardiac monitors, and other equipment was once relegated to intensive care units where staffing patterns of 1:1 or 2:1 were common. Increasingly this technology is available throughout the hospital and even in the home environment.

That the technology is useful and cost effective is not the point. Rather it is clear that nursing patterns have not changed to adapt to this new work environment. The nurses must not only nurse the patient but also the patient's equipment. The installed equipment does not address tasks and domains which have been traditionally those of nurses. Rather, the technology addresses domains typically belonging to pharmacy, physicians, respiratory therapy etc.

Without alterations in the work environment, the nurse has been drawn away from the patient focused care which has been the mainstay of nursing into the realm of machine maintenance. While nurses have traditionally used much technology, as a group they tend to be techno-phobes. In addition to the fact that this technology has not addressed nursing needs, this technology has not been very flexible. It has done one job in one manner, and alarmed rather mercilessly when anything in the environment has affected its optimal functioning.

With the addition of both the technology and the increased number of specialized players in health care, the nurse is often the only constant thread the patient sees on a regular basis. As such it becomes the responsibility of the nurse to be more involved in patient teaching, and in information giving and clarification. Nurses are expected to have access to and an understanding of an increasingly broad range of knowledge.

There is an increase in research into the nature of nursing practice itself. We know that historically nurses have worked in self-imposed isolation and have not valued communication among nurses [2]. Nurses historically have valued task completion, and technical competency for the tasks done to the patient, over knowledge and communication of knowledge among nurses and other health professionals. The rewards for mastering complex task skills have been studied by Rukholm et al. [13].

Graves and Corcoran [8,9] have been among the most influential in coming to grips with the critical elements which are necessary for the nursing discipline specific elements of a CWS. They have done this by identifying the nursing elements necessary in nursing information views.

MEDICAL CULTURE

Traditionally, doctors have seen themselves as in charge of the patient's care and ultimately responsible for it. They see themselves orchestrating the diagnostic workup, specifying the therapeutic plan, and monitoring and adjusting for the patient's response to disease and its treatment. Cali [3] characterizes this aspect of medical culture as professional omnipotence. Power is derived from 'outdoing' others to demonstrate medical integrity. Campbell-Heider and Pollock [4] explored cultural assumptions of the physician and the nurse as they relate to collegial practice. They note that barriers include the association of gender and role. The nurse is traditionally seen by the physician in a hierarchical framework, where the nurse works under the authority of the physician. Nursing, by contrast, sees

the professions as separate with a decentralized line of authority. In the physician's hierarchical model, there is the assumption of a single person with final responsibility at the top of the hierarchy.

The doctor's sense of authority is further protected by limiting access to the physician. Campbell-Heider and Pollock [4] note the differences in interaction between the nurse and physicians, and the patients. The physician-patient interaction tends to be brief and ceremonial, while the patient nurse interaction tends to be on-going and normalized. They suggest that these roles parallel the traditional male/female roles in society. The doctor provides a distinct deliverable, based on special expertise. By contrast the nurse's role is based on the on-going caring for the patient over time.

Medicine has traditionally focused on the *disease* [4]. With the biophysical model, *disease* parallels the hierarchical structure with a cause and effect relationship. From the medical view, it is the diagnosis which is the rationale for the patient's very presence in the health care system. The diagnosis is the organizational construct around which data is collected and structured, acts as a guide for all intervention, and becomes the focus for outcome measures. The disease focused domain belongs to medicine. Nursing has traditionally focused on *illness* which includes the patient's subjective experiences and practical difficulties which are the result of the *disease*. Though the doctor makes key decisions about the patient's care, with the exception of procedure-based therapies, nurses are seen as the primary implementors of care. Doctors are generally comfortable with the nurse being "the hands of the physician". Grol et al. [10] have noted that the focus on disease is beginning to change in some areas of the world.

Cali [3] notes that physicians value scientific rigor, that the acquisition of knowledge is placed above other priorities, and that emotional response are to be addressed in private. This view of scientific objectivity separates human response from the fact of the observed situation. The ownership and use of prized medical knowledge and information preserves the role and status of the physician. The structure and organization of the knowledge are critical for the view of diagnostic reasoning.

CLINICIANS' WORKSTATION

The philosophy underlying a true CWS is very different than what has preceded in the area of computing. The CWS is not targeted to a single clinical group. Rather, it tries to focus on the clinical needs of a variety of providers and in so doing, make all clinician groups more efficient and effective. One goal is to make it easy for clinicians to focus their decisions and care around the needs of individual patients. The result is that data from a variety of independent or semi-independent information systems such as laboratory, pharmacy, radiology are to become available in an integrated fashion tuned to the patient's problem rather than a hospital department's structure. At the University of Minnesota Hospital and Clinic we've used distributed architectures, and adopted standards such as SQL, HL/7, MEDIX, TCP/IP and Ethernet to support this integration. The emphasis is on gathering, displaying and managing information in ways which assist each clinical group in doing their independent and interdependent tasks.

The CWS must be developed and able to work in an area where complex cultures have yet to clearly define all of the relationships which exist between health care providers. Each discipline has unique needs and values. These must not only be reflected in the current state of the CWS, but it must be sufficiently flexible to meet the changing needs of the various professions as they combine their talents in patient centered care. Rapidly evolving external forces, not necessarily in sympathy with current cultural views, will be exerting unpredictable demands on all health care workers in the years ahead. Our technical coping strategies to support the absolute need for ongoing change include a client-server architecture, flexible database servers, object technology, and high-level user interface development tools.

GENERAL IMPLICATIONS

If a CWS is going to be most effective, it must meet the multiple information management needs of the various clinical disciplines, medicine and nursing being the predominant ones. First, a CWS must be highly adaptable and malleable to allow for easy upgrading and modification. It is unlikely that clinicians will be able to easily and precisely describe what they would like to have the system do. Flexible and adaptable information technology has been rare in clinical domains. As a result, there will be a 'learning curve' in order to decide how and when to use this technology. Again we must remember, as Byers [2] points out, that nurses historically have worked in social isolation. Nurses individually may not be able to explain their goals and desires for this technology, but also nurses are not likely to agree amongst themselves as to what is the best way to practice. There is little reason to suspect physicians will show any more unified agreement. In our experience the use of high-fidelity, rapid prototyping methods with a focused task force of clinicians is very helpful in drawing out needs and potential solutions. But object technology and high-level interfacing tools are critical to cope with the inevitable flux that arises from a growing

appreciation of information management need and potential in the midst of a rapidly changing environment.

Both cultures have contributed to the language of science and health care but with intra- and inter-professional overlap , redundancy is one of the negative fallouts. Mauksch [11] described in considerable detail how 'front line' nurses have become separated from nurses in academia and nurses in management positions. The formal structures and taxonomies which have been developed to assist in the precision of academia often have little bearing in the clinically oriented world of the 'front line' nurse. Problems in understanding the elements of practice vs. the formal understanding of practice have been addressed by Turley et al. [16]. National Library of Medicine's Unified Medical Language Systems project and other research efforts are advancing knowledge in this important area. In the interim, CWS developers must incorporate the less well structured language of clinicians and be ready to evolve and adapt to changes in clinical vocabulary.

NURSING IMPLICATIONS

What is clear from the outset is that technology has not been kind to nurses or nursing. The workstation may indeed be the first technology which can assist the nurse in the delivery of nursing care. In order to accomplish this, there needs to be a clear understanding of nursing clinical practice, including an organization of knowledge in a manner which is useful to the 'hands on' delivery of nursing care. If the clinician workstation does not meet that critical goal, it will fail.

Nurses have a long history of standards and policies. This is particularly true in the areas of task specific practice. In a given hospital, and in some times on a given unit, there is a book which describes in great detail the process for performing tasks. We remember that task specific knowledge is highly valued by nurses. Yet while there is a value on tasks, nurses as a group tend to ignore or overlook the knowledge which is necessary for the performance of the tasks unless it is conveniently accessible in a usable format. Such access can be provided via a CWS that provides ready access to information bases that can be intuitively searched.

Unlike medicine and some of the more established disciplines in health care, access to a CWS is likely to change the nature of nursing practice considerably. While nursing is an information intensive discipline, nurses as a group have not valued their own facility with information. In addition, the relationships between nurses and other professions has traditionally been based on the complex tasks which the nurses perform. Melosh [12] referred to nurses as the hands of the physician, and Byers [2] showed that it was the tasks which nurses themselves valued. However, studies have shown that up to 50% of nursing time is involved with charting and record keeping. If the CWS can be used to relieve nurses of the 'paper burden' and allow them to return to the patient centered care which is not only their hallmark but also what they value doing, then the CWS can be a success. The CWS must structure nursing knowledge and information in ways that allow nurses to do what they value.

The decision making process in nursing is different than it is for most health care providers. Nurses are with the patient on a 24 hour a day 7 day a week schedule. However, the same nurse is seldom with a patient for a given period of time. The result is that there are a variety of decision makers across any period of time making a cascade of sequential judgments. For nursing this points to an interesting form of a group, where the group never meets. This type of decision making is little understood, thus it is less than clear how a CWS can be used to support it. More research is needed in this and other areas of group decision making. In any event, the CWS should be able to adapt to various models of the decision making process.

MEDICINE IMPLICATIONS

Campbell-Heider and Pollock [4] have discussed the medical need to focus on facts and disease. The structure of the medical view of the CWS must be able to assist that need. Data must be gathered in factual organization and presented in ways which mirror the organization of data in making a diagnosis. Connelly et al. [6] have already demonstrated the success of presenting data organized in a way that is mapped to a specific clinical decision task. While a decision support system may also be available to assist with the decision making, it is the presence of structured data which allows the physician to focus on the decisions which are necessary to impact on the diagnosis.

Because the physician patient interaction is brief, the CWS must present data to the physician in an economical way. In-depth data must be available for review, and be available when long term views are warranted. Data is used to determine the degree of change in the disease. The use of data can confirm improvement in the disease state or record a deterioration. With the focus on the disease, the data should be organized to see these trends in an economical manner.

Direct order entry by physicians is of growing interest as a means of reducing errors and allowing for immediate decision support. However, physician acceptance of this has been limited. While physicians are comfortable writing an order in a

chart, it is insensitive to their cultural norms to ask them to enter numerous specific scheduling details into a workstation. That level of detail is usually better handled by others. For instance, while a physician may order five platelet concentrates to be given, the patient's nurse who will be hanging those blood products is in a better position to tell the blood bank the hour of the day for its delivery. An effective CWS minimizes physician effort for order entry, facilitates the logistic work of others who refine and execute the order and provides unobtrusive feedback to the physician regarding compliance with the order.

Our CWS is intended to provide immediate feedback to the physician as to the appropriateness of a platelet transfusion request. Clearly this touches on a key cultural issue of medical autonomy. Sensitivity to this cultural issue has led us to clearly communicate that feedback is based on the medical staff's own guidelines, that the feedback is only a reminder of the medical staff's preferred practice, and that housestaff education is a primary concern. Physician autonomy is explicitly acknowledged through an advisory that recognizes that guidelines are guides only and that physicians judgment prevails over their application to individual patients.

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